



Federal Aviation Administration

Memorandum

Date: June 30, 2010

To: See Distribution

From: Mark R. Schilling, Acting Manager, Rotorcraft Directorate,
Aircraft Certification Service, ASW-100 *Mark R. Schilling 6-30-10*

Prepared by: George Schwab, ASW-112, (817) 222-5114

Subject: Policy Statement on Approved Model List (AML)
Supplemental Type Certificate (STC) Approval of Avionics
Installations on Rotorcraft

Memo No.: ASW-100-09-001

Reference: FAA Order 8110.4C, section 4-13

Summary

This policy statement provides guidance on Approved Model List (AML) Supplemental Type Certificate (STC) approval of avionics installations on type certificated rotorcraft. This guidance is a result of our experience with rotorcraft AMLs and the issues we have encountered with AML STC applications and projects.

Current Regulatory and Advisory Material

FAA Order 8110.4C, section 4-13, allows the issuance of a single STC for more than one type certificated product and stipulates conditions that must be met. However, the applicant must still show compliance, plus provide the substantiating data and necessary type design data for each of the models listed on an AML STC.

Relevant Past Practice

The AML STC process has sometimes been incorrectly seen as an abbreviated path to obtain installation approval on multiple models and types of rotorcraft. The purpose of

the AML STC is to allow a convenient packaging of data for multiple models of rotorcraft for which certification compliance has been shown. It is necessary to show compliance with every applicable regulation for each rotorcraft model included on the AML STC. An AML STC is a variation of a multiple STC that affords the sharing of common certification data for a product being installed, while still requiring all unique certification data for each specific model included on the AML. The AML STC has the added flexibility of allowing the inclusion of models from more than one type certificate data sheet (TCDS).

Policy

Avionics that incorporate complex integration with existing systems such as global positioning, autopilot, and navigation, are considered to be very rotorcraft model specific. Only when these complex systems have been completely tested, evaluated, and documented for each specific model, would they be considered appropriate for an AML STC. Avionics that are relatively simple, with respect to the amount of integration to existing systems and with broad application across many rotorcraft models, may benefit from the AML STC process. The following guidelines are intended to help ensure compliance with all of the applicable regulations for each rotorcraft model included in the AML STC process. These guidelines also apply to new models being added to existing AML STCs issued prior to this policy.

1. A key element of the AML process is the use of a single set of compliance data to be applied to multiple models of rotorcraft. The intent is to avoid duplication of testing and data gathering but still ensuring the airworthiness of the modified product. The compliance data package must be detailed enough to allow for a compliance finding to be made. However, the compliance data package may be used to show compliance for multiple models on the AML STC if the similarity between the models is adequately shown and documented. The responsible Aircraft Certification Office (ACO) and the applicant must agree on this approach and ensure the guidelines in this policy statement are applied.
2. Other aircraft types, such as small airplanes, transport airplanes, gliders, and balloons, should not be included on rotorcraft AML STCs, because of potentially significant differences in airworthiness standards and policies.
3. The AML STC certification basis should not include a combination of Civil Air Regulation (CAR) part 6, 14 CFR part 27, CAR part 7 or 14 CFR part 29 rotorcraft (for example, one AML STC might include CAR 6 rotorcraft, while another AML STC might include part 27 rotorcraft, and yet another might include part 29 rotorcraft). Differences between these regulations may be significant, and even in instances where the regulations are identical, the application of those regulations may be different depending on whether a specific model rotorcraft is certified for instrument flight rules (IFR) operation or Category A operation. Defining the certification basis for rotorcraft certified under different rules, even when they are included on the same TCDS, will require added diligence to ensure that all applicable

rules are included in the certification basis. The expected approach, when combining rotorcraft certified under different regulatory rules on an AML STC, would be to have all models on that AML STC meet the highest certification standards of any model on that AML STC.

4. Normal and transport category rotorcraft should not be included on the same AML STC, because the certification basis may be significantly different. Including restricted category with standard category rotorcraft on the same AML STC will require that the restricted category rotorcraft meet the same requirements as the standard category rotorcraft.
5. The AML STC applicant must clearly identify the certification basis, including amendment levels, for each of the listed rotorcraft models in the certification basis document for the AML STC. Because the certification basis can vary between models, each model included or added to the AML STC will require establishing its own certification basis per 14 CFR § 21.101. Each configuration of a particular model must be included in that certification basis. One approach could be to have two sections on the AML STC. The first section could list all the applicable § 21.101 regulations in the installation that will be brought up to the latest amendment level and the second section could list all the models with their TCDS and original certification basis. As an alternative, it is acceptable to make the rule requirements at the current amendment level the certification basis for the design change.
6. The AML STC applicant must show the means of compliance for each of the regulations listed in the certification basis for each model. Identify and verify these means in the compliance checklist to ensure that the means of compliance are appropriate for the amendment level of the regulations. Typically, this will be included in the certification plan presented to the ACO. However, the ACO and the applicant may agree to include this in other parts of the STC documentation, such as in a G-1 issue paper. Each model included in the AML STC must have the certification basis and the means of compliance to those regulations included in the certification basis clearly defined and documented.
7. The AML STC applicant must determine the specific installation requirements for each model. The installation requirements must provide sufficient guidance to allow the installer to accomplish the installation and show that the installation is in conformity with the approved type design for each model on the AML STC. As part of the certification data for showing compliance, identify and address any differences in the approved rotorcraft models that can have an effect on the acceptability of the installation. The AML STC will require engineering data to determine proper fabrication, installation, and any other specific instructions by model type and configuration for each model listed in the AML STC list. For example:
 - a. Depending upon the results of the model specific system safety assessment (SSA) of the product, it may be necessary to address parts 27 or 29 high intensity radiated field (HIRF) and electromagnetic interference (EMI) requirements for

each individual model being included on the AML STC. This is necessary because of the differences in levels of airframe attenuation, wire harness routing, structural differences, and their potential effects on different installed equipment. Advisory Circular (AC) 20-158 provides information and guidance on how to show compliance with the regulations on HIRF. Very prescriptive installation instructions will need to be included in the data package for bonding, strapping, connectors, backplanes, wire routing, shielding, etc. Post installation EMI and functional checks must be clearly prescribed.

- (1) Full authority digital engine control (FADEC) equipped rotorcraft will require showing that the equipment being installed does not interfere with the FADEC.
 - (2) FADEC, air data attitude heading reference systems (ADAHRS), or electronic flight instrument system (EFIS) equipped rotorcraft may also require special provisions for identifying acceptable antenna and added equipment installation locations. If the equipment being installed by the AML STC is connected or coupled to required systems and its failure or malfunction could create hazardous or catastrophic conditions, integration evaluation and a safety analysis are necessary for each rotorcraft model and configuration.
- b. Typically, the installation of equipment qualified to the more robust DO-160 environment levels for helicopters should be sufficient for avionics installations in rotorcraft. However, the AML STC applicant will need to assess the DO-160 environmental qualification levels (for example, vibration, temperature, altitude, EMI radiation) against the actual installation environment for each of the listed AML rotorcraft models because there may be significant variations from one model rotorcraft to another.
 - c. Based on the model specific SSA, appropriate DO-178B/DO-254 software and complex electronic hardware (CEH) development and design assurance levels need to be addressed.
 - d. Clearly identify any differences in the installation of the equipment in drawings and installation instructions for each model on the AML STC. Electrical wire routing may vary between rotorcraft models and requires consideration of potential consequences of these variations to both function and safety for each model's installation data. For example, connecting a nonessential system to an essential power bus could create a potential safety hazard if the nonessential system failed and disabled the essential power bus or the installation of an antenna near a FADEC may cause interference with the FADEC critical functions.
 - e. Clearly state any limitations on the face of the AML STC and at the beginning of the installation instructions for each model to which the limitations apply.

- f. Identify the antenna locations for each model and provide substantiating engineering data (for example, test data, analysis) because location will vary between models. Identifying and substantiating a list of alternate antenna locations is recommended because the primary location may have been used by other installations. The antenna location decision must also consider lightning if lightning protection is in the certification basis (§§ 27.610 and 29.610). Depending on the actual antenna location and the lightning zone, lightning tests may be required for either direct or indirect, or both effects of lightning. If a lightning requirement is not in the certification basis, then the effect of lightning on an antenna location should still be considered.
 - g. Identify in the type design the specific affected system and whether the AML STC equipment being installed interfaces with required rotorcraft systems. For example, if the AML STC is for installing a new Horizontal Situation Indicator, the applicant must identify the gyro used in the certification approval testing. Compatibility of interfaced equipment must be determined and included in the AML STC. The AML STC applicant needs to list all the equipment that has been tested to function properly with the system being installed on each model in the AML STC. There should be a preinstallation checklist provided to show whether that same equipment is installed in the rotorcraft being modified. If the configuration of the rotorcraft being modified is different from the model tested for the AML STC, the responsibility for showing compatibility with these differences will fall on the installer because the AML STC will not authorize the installation on this untested configuration.
8. The AML STC applicant must substantiate that (per CAR 6.606, § 27.1309, or § 29.1309) the installation does not introduce any hazards to the rotorcraft. Examples of hazards potentially introduced include fires, due to electrical overloads within the equipment; electrical wire fires, resulting from inadequate current protection in the installation; and EMI with other required equipment or systems. The structural installation should also consider differences between models to prevent introducing hazards. This would include physical mounting integrity and potential problems with a location such as mounting a unit under a seat designed to absorb energy by crushing or crumpling during a crash.
9. The AML STC applicant must provide substantiating engineering data for each rotorcraft model to show no compromise of the fault protection scheme of the electrical power generation and distribution system. The determination of wire size, routing, power requirements, over current protection, electrical load analysis, and any other pertinent installation details must be included in the AML STC. An example would be ensuring that nonrequired equipment is not connected to an electrical bus that supplies power to systems required for continued safe flight and landing (for example, emergency and essential buses). Connecting nonrequired or nonessential equipment to an essential or critical level bus, without a dedicated means to remove power to all the nonrequired equipment, may inhibit the ability of the crew to quickly remove power from this equipment during an emergency.

10. The AML STC applicant should be aware that adding a model with a different certification basis (that is, visual flight rules (VFR) versus instrument flight rules (IFR) or Category B versus Category A) may require additional equipment, design analysis, and flight tests. Even if the particular regulation is identical, the application of that regulation may be different because of the different operating environment. For example, the reliability of certain equipment in the IFR environment may be required to exceed that required in the VFR environment. In addition, the applicant must address the introduction of any added equipment to an IFR certificated rotorcraft that may affect the IFR certification of that model. Introducing new or changing existing cockpit procedures or configurations to a previously approved IFR or Category A rotorcraft will require an assessment and possible flight evaluation before approval.
11. If a rotorcraft flight manual (RFM) supplement is necessary, an FAA approved RFM supplement will be required for each model on the AML STC. A RFM supplement will be necessary if the installation of the item being installed by the AML STC changes rotorcraft performance, emergency procedures or limitations.
12. The AML STC applicant must determine if their system has any potential negative effect on existing systems that perform required functions. In addition, the applicant must be aware of all special conditions for each rotorcraft model having systems performing critical functions and consider the impact that the introduction of their proposed system may have on these existing systems.
13. Instructions for Continued Airworthiness (ICAs) must be accepted, in accordance with FAA Order 8110.54, by the Fort Worth Aircraft Evaluation Group (FTW-AEG) and the Airworthiness Limitation Section (ALS) must be approved by the FAA, for each model listed on the AML STC. The ICAs must be prepared in accordance with the requirements of 27.1529 or 29.1529, as appropriate. Contact the FTW-AEG early on in the project to coordinate the acceptance process for the ICAs.

Effect of Policy

The intent of this guidance is to aid the applicant and ACO in determining whether an AML STC is an appropriate option for a particular project. It is important for the applicant to advise the ACO early in the program that they plan to request an AML STC. This is to ensure that the applicant understands that all applicable regulations must be complied with for each model and to agree on the models that can be combined on a single AML STC.

Conclusion

An AML STC does not relieve the applicant from showing compliance with all applicable regulations for each model rotorcraft listed in the proposed AML STC. Early coordination with the FAA can help expedite the project. Please contact the Rotorcraft

Standards Staff for guidance before adding models to existing rotorcraft AML STCs issued prior to this policy. If you have any questions or need to discuss this policy, please contact Mr. George Schwab at (817) 222-5114 or e-mail at george.schwab@faa.gov.

Distribution List:

Manager, Rotorcraft Directorate Standards Staff, ASW-110
Manager, Ft. Worth Airplane Certification Office, ASW-150
Manager, Ft. Worth Rotorcraft Certification Office, ASW-170
Manager, Ft. Worth Special Certification Office, ASW-190
Manager, Small Airplane Directorate Standards Office, ACE-110
Manager, Atlanta Aircraft Certification Office, ACE-115A
Manager, Chicago Aircraft Certification Office, ACE-115C
Manager, Anchorage Aircraft Certification Office, ACE-115N
Manager, Wichita Aircraft Certification Office, ACE-115W
Manager, Brussels Aircraft Certification Staff, AEU-100
Manager, Engine and Propeller Directorate Standards Staff, ANE-110
Manager, Boston Aircraft Certification Office, ANE-150
Manager, New York Aircraft Certification Office, ANE-170
Manager, Transport Airplane Directorate Standards Office, ANM-110
Manager, Denver Aircraft Certification Office, ANM-100D
Manager, Los Angeles Aircraft Certification Office, ANM-100L
Manager, Seattle Aircraft Certification Office, ANM-100S
Manager, Standardization Branch, ANM-113
Manager, International Branch, ANM-116
Manager, Aircraft Certification Procedures Branch (AIR-110)